NAVAL POSTGRADUATE SCHOOL
Monterey, California

THESIS

IMPACT OF THE INTEGRATED MAINTENANCE CONCEPT ON EA-6B READINESS AND MAINTENANCE SUPPORT AT NAS WHIDBEY ISLAND, WA AND NADEP JACKSONVILLE, FL

By

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June 2002

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REPORT DOCUMENTATION PAGE			*Form Approved OMB No. 0704-0188*

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.

1. AGENCY USE ONLY *(Leave blank)*	**2. REPORT DATE** June 2002	**3. REPORT TYPE AND DATES COVERED** Master's Thesis

4. TITLE AND SUBTITLE: Impact of the Integrated Maintenance Concept on EA-6B Readiness and Maintenance Support at NAS Whidbey Island, WA and NADEP Jacksonville, Fl	**5. FUNDING NUMBERS**
6. AUTHOR(S) Schulz, Kimberly J.	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000	**8. PERFORMING ORGANIZATION REPORT NUMBER**
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A	**10. SPONSORING/MONITORING AGENCY REPORT NUMBER**

11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for Public Release; distribution is unlimited.	**12b. DISTRIBUTION CODE**

13. ABSTRACT *(maximum 200 words)*

Faced with an aging Navy air force, the EA-6B, a piece of the aging aircraft inventory puzzle, is included in a mandated program called Integrated Maintenance Concept (IMC.) IMC incorporates a maintenance process called Reliability Centered Maintenance (RCM) to establish and adjust preventative maintenance requirements. The premise of the program is to justify each preventative maintenance action to maintain obsolescent airframes while reducing aircraft out-of-service-time and operating support costs. The implementation of a preventative maintenance program validated by RCM coupled with the fixed period end date (PED) will, in theory, reduce total ownership costs (TOC) to include reduced depot level turn around and scheduled maintenance time.

The objective of this thesis is to ascertain how the move from SDLM to IMC is impacting the community from all perspectives and their views on readiness and supportability. To gather data, the researcher conducted on-site interviews with key players at all levels of maintenance support. IMC, with the incorporation of RCM justified preventative maintenance actions can positively impact the life of the aircraft however, to make it possible, the depot field site has to be fully supported and the organizational and intermediate levels manned at appropriate levels and training in structures repair, priority.

14. SUBJECT TERMS EA-6B, Depot Maintenance, Intermediate Maintenance, Organizational Maintenance, ISR, ASPA, IMC			**15. NUMBER OF PAGES** 65
			16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT Unclassified	**18. SECURITY CLASSIFICATION OF THIS PAGE** Unclassified	**19. SECURITY CLASSIFICATION OF ABSTRACT** Unclassified	**20. LIMITATION OF ABSTRACT** UL

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. 239-18

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IMPACT OF THE INTEGRATED MAINTENANCE CONCEPT ON EA-6B READINESS AND MAINTENANCE SUPPORT AT NAS WHIDBEY ISLAND, WA AND NADEP JACKSONVILLE, FL

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Submitted in partial fulfillment of the
requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
June 2002

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Faced with an aging Navy air force, the EA-6B, a piece of the aging aircraft inventory puzzle, is included in a mandated program called Integrated Maintenance Concept (IMC.) IMC incorporates a maintenance process called Reliability Centered Maintenance (RCM) to establish and adjust preventative maintenance requirements. The premise of the program is to justify each preventative maintenance action to maintain obsolescent airframes while reducing aircraft out-of-service-time and operating support costs. The implementation of a preventative maintenance program validated by RCM coupled with the fixed period end date (PED) will, in theory, reduce total ownership costs (TOC) to include reduced depot level turn around and scheduled maintenance time.

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ACKNOWLEDGMENTS

The author would like to acknowledge the support provided by all echelons in the EA-6B community, in particular Depot Production Manager, Monty Pearce; ISR Team Leader, Mike Bonnet; Veridian Field Representative, John Boone and RCM Analyst Joe Oglesby; CVWP MMCO, LT Denis Berry and AZC Sharon Vogle; EA-6B Configuration Manager, Mike Johannsen and; VAQ 139 MMCO, LT Tom Gibbons who provided the fleet perspective. Their expert knowledge and candor were invaluable to this analysis. Additionally, the author would like to thank her thesis advisors, Don Eaton, RADM (ret.) who provided the initial funding that was critical in building initial contacts and Professor William Gates, they both provided the guidance and patience during the writing phase of this document. Finally, the author is most grateful to her family for the constant support as she worked to complete the thesis.

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I. INTRODUCTION AND BACKGROUND

A. PURPOSE

This Thesis will determine how the transition from Standard Depot Level Maintenance (SDLM) to Integrated Maintenance Concept (IMC) has affected the three levels currently performing maintenance on the EA-6B aircraft. The Thesis focuses on EA-6B support in Whidbey Island where there are currently 79 aircraft assigned: 72 located with the squadrons and seven at the depot. It addresses how IMC is to be incorporated on the aircraft, projected readiness levels and support issues.

This thesis also examines current attitudes towards IMC implementation from several perspectives, including maintenance personnel at the Wing, organizational, intermediate, depot and contracted.

B. BACKGROUND

The EA-6B "Prowler" aircraft became part of Navy's inventory in 1971 and is the U.S. Navy's only tactical jamming aircraft. The last production aircraft rolled off the Grumman assembly line in 1991, and since that time the aircraft have gone through four major upgrades to prepare it for dynamic threats and expanding mission roles. After retiring the Air force EF-111 Raven in 1998, it is the only national asset serving the front line on every strike package, carrier and land based, for the United States.

There are 122 of these aircraft and approximately 98 at any given time are dispersed out to the fleet: Navy, Marines and Naval Reserves. The remainder are located at the Depot or Original Equipment Manufacturer (OEM) undergoing some type of depot level repair, modification, SDLM and now, IMC. Thirty-three of the aircraft have the latest upgrade: Block 89A; one has the next scheduled upgrade: ICAP III; 25 are Block 82s and are restricted from deploying to the carrier and the rest are Block 89 aircraft. Of the total, 34 are restricted to 3 G's. There is not a replacement identified for the aircraft and because it is such a valuable asset, its service life was extended from 2005 to 2015. This will result in most of the aircraft reaching over 30 years of age at retirement.

Figure 1 EA-6B Prowler

Faced with an aging Navy air force and many platforms without a replacement, senior leadership embarked on a mission to preserve its already tired inventory. The EA-6B, a piece of the aging aircraft inventory puzzle, is included in the best value solution to the dilemma and meeting affordable readiness goals; a mandated program called IMC. IMC incorporates a proactive maintenance process called Reliability Centered Maintenance (RCM) to establish and adjust preventative maintenance requirements for all three levels of support. The premise of the program is to justify each preventative maintenance action to optimally maintain obsolescent airframes while reducing aircraft out-of-service-time and operating support costs. In addition, IMC includes establishing a fixed period end date (PED) for each of the aircraft, which results in a standardized depot induction schedule. The implementation of an accurate preventative maintenance program validated by RCM coupled with the fixed PED will, in theory, reduce total ownership costs (TOC) to include reduced depot level turn around and scheduled maintenance time. (TEAM, 1999)

One of the arguments that justifies IMC utilizing RCM analysis is that we 'over-inspect" aircraft. Opening panels and removing components to inspect, in many cases, is not necessary and oftentimes leads to failed components just by the sheer removal and replacement process.

Opponents of the mandated program say the military is shifting the maintenance burden from the depot level to the backs of our sailors in the organizational level, as a way to save money.

Despite the pro and cons, is the answer IMC? This paper explores how IMC is projected to impact aircraft readiness and availability, and how it will impact the various levels of maintenance once fully implemented in the EA-6B platform.

C. SCOPE OF RESEARCH

This research evaluates the impact of IMC and how it will affect EA-6B readiness, both short and long term at the depot and in aircraft assigned to NAS Whidbey Island. Aircraft assigned to the Marines in Cherry Point, testing in Point Mugu and the Reserves at Andrews Air Force Base are not considered in this analysis. To evaluate readiness, the research includes how IMC will affect organizational, intermediate and depot levels of maintenance and support. The objective is to determine the value of implementing the concept as a replacement to the SDLM and current preventative maintenance process. Research includes analyzing current and planned EA-6B readiness and research in planned organizational, intermediate and depot roles in support and maintenance of the IMC process.

D. METHOD OF RESEARCH

The methodology used in this thesis research consisted of the following components:

1. Literature Review

Reports on Aircraft Service Period Adjustment (ASPA)/SDLM and IMC lessons learned on other aircraft were reviewed. A compilation of IMC and RCM documents from multiple sources were researched and studied to gain knowledge of the program.

2. Interviews and Meetings

Attended the Maintenance Action Group (MAG), which identified relevant issues pertaining to the EA-6B program. On-site formal and informal meetings and interviews were conducted with key players in the organizational, intermediate, depot levels of maintenance, in addition to the Type Wing, RCM contractor, and NAVAIR to gather information on the status, popularity and success of the IMC program.

3. Data Acquisition and Analysis

-Historical 3M summary data was collected for the past year to analyze trends.

-IMC implementation data was collected to determine actual and predicted turnaround times and costs.

-Draft plans for RCM and Planned Maintenance Inspections for the field and depot levels were obtained to compare the SDLM/ASPA inspections with the proposed phased maintenance interval (PMI)/IMC inspections.

4. Organization of Study

Chapter II discusses the ASPA, IMC Program and how IMC is being implemented on the EA-6B aircraft.

Chapter III analyzes the affects of IMC implementation on the three levels of maintenance and readiness.

Chapter IV discusses the conclusions and recommendations drawn from the research and analysis. There are also recommendations for further research.

A list of acronyms used in this thesis is contained in Appendix A.

II. DISCUSSION OF IMC PROGRAM

A. ASPA

The ASPA program was implemented in naval aircraft in 1984. It was determined that inducting an aircraft into the SDLM process automatically at the end of its period end date (PED) did not make sense without first looking at the material condition of the aircraft. There were cases where the aircraft was in excellent condition at the time of induction and instead of spending unnecessary funds on the aircraft overhaul, it would have been better to have the aircraft out in the fleet until it was ready for depot maintenance.

When an aircraft reached its PED, the year and month at the end of the aircraft's operating service period, it received an ASPA inspection by a qualified depot level field team. If the team determined the aircraft was in sound material condition, it received a twelve-month extension at which time another ASPA inspection occurred.

ASPA was intended to reduce the number of SDLM inductions and save money by changing the cycle from a constant on-time basis to an on-condition basis. (Hatcher, 1997) What resulted over time was the unpredicted nature when an aircraft would finally fail ASPA and have to be inducted into the depot. ASPAs would fall once a year and the variability of the deferrals was random. When an aircraft failed an ASPA in a forward deployed squadron, they had to send the aircraft back to the depot and await a relief aircraft, usually from a squadron that just returned from cruise or early in their training cycle. Aircraft configuration managers had to jump through hoops to keep squadron aircraft inventories at the right number for where they were in the training cycle and correctly forecast the number of depot inductions to schedule. When a bow wave of aircraft failed without scheduled funding in place, aircraft sat on the tarmac at the depot awaiting funding authorization and readiness declined.

By 1998, squadrons did not have a full allowance of aircraft on the flight line. Department of the Navy (DoN) total aircraft inventory (TAI) was 3869, 255 aircraft below the total aircraft authorization (TAA) of 4124. (*Note 1: TAA is the sum of primary aircraft authorization (PAA) and Backup Aircraft Authorization or pipeline (BAA).)*

Air Tycom and Type Wing staffs tried to mitigate the effect of the shortage by carefully managing aircraft assets and depot inductions, but were not able to preclude squadrons from falling below their authorized allowance during the turnaround cycle. They had to constantly transfer aircraft from one squadron to another to meet training and operational requirements.

The aging aircraft inventory challenged maintenance efforts at all levels. Feedback from the NADEPs indicated a worsening trend in the material condition of the aircraft inducted, adversely impacting turnaround time reduction efforts and costs. This was further exacerbated by the airframe engineering issues that began to surface, such as the F-14A fatigue life expended (FLE) reduction and the EA-6B wing FLE (AMSR, 1998). Immediate action was needed to stabilize the force to CNO inventory goals, and mitigate the impact of an aging aircraft inventory.

B. IMC

The transition from SDLM to IMC is endorsed by the Chief of Naval Operations (CNO) and calls for selected aircraft programs to transition to fixed PEDs using RCM analysis as a sustained maintenance planning base. It is a major component of the Navy's Affordable Readiness Initiative and is expected to reduce maintenance costs and improve aircraft availability. At the inception of IMC, aircraft under SDLM and paint and corrosion evaluation (PACE) programs accounted for over 70% of the total active aircraft inventory. When IMC is fully implemented, PACE will be eliminated and F-14's and four types of contractor-supported aircraft will be the only remaining SDLM aircraft, all of which are scheduled for retirement. (IMC, 1998)

To improve the overall material condition of Navy aircraft, the CNO directed the Naval Air Systems Command (NAVAIR) to develop a plan for making depot maintenance requirements more predictable and affordable. The transition plan is to be expedited by NAVAIR 3.0 to reduce the time aircraft spend in depot maintenance and review scheduled maintenance requirements based on RCM analysis. The primary goals of the IMC program are:

-fixed period end dates. This will identify a specific number of depot level inductions to budget for each year. With the SDLM program, this was not possible because it was an estimate banking on most aircraft not failing ASPA until a future date.

-integrated depot-level/organizational-level maintenance tasks based on RCM analysis. This is designed to eliminate redundancy and reduce costs.

Other objectives include:

-increased aircraft availability. The result is more shadows on the ramp instead of homesteading at the depot waiting for funding authorization, which helps realize PAA objectives.

-implementation plan that is at least cost neutral compared to current SDLM Future Years Defense Program (FYDP) budget. No additional funds will be made available just because a program shifts from SDLM based depot maintenance to IMC.

-reduced long term ownership costs. This is the sum of all the financial resources necessary to support a platform from inception to disposal.

-improved material condition over the life of the aircraft. The integrity of our aircraft safety will not be compromised.

To satisfy the primary IMC goals, there are three main elements that make up the program as defined in NAVAIRINST 4790.33:

-RCM analysis that includes reviewing all maintenance tasks without regard to specific levels of repair or organizational structure. It relies on decision logic for defining PM tasks that are applicable and effective for a specific set of failure modes and effects.

-consolidation of maintenance tasks that minimize the duplication of effort among organizational (O), intermediate (I) and depot (D) levels. Reducing the number of tasks and combining multi-level tasks may yield significant reductions in aircraft down time, an important objective of IMC. The most effective, economical overall solution will be recommended based on RCM data analysis.

-fixed PEDs that are established on a Type/Model/Series (T/M/S)-by-T/M/S basis according to RCM Preventative Maintenance (PM) task, operational and economic analysis.

In accordance with NAVAIRINST 4790.20A, RCM engineering analysis will be revised to develop and identify PM tasks that will result in the highest degree of availability and readiness at the lowest overall life cycle cost. IMC targets improvement in the overall material condition of the aircraft to minimize life-cycle costs and out of service time.

Using the P-3 and E-6A maintenance programs as a baseline, representatives from the engineering, logistics and industrial competencies, along with members of the N881 staff, decided on a two-step process for the formal transition of an aircraft platform from SDLM to IMC. It is left up to the program teams to determine exactly how their individual IMC programs look, but before embarking on full-scale implementation, the proposed process has to be authorized by the CNO (N881). For example, the absolute minimum requirement to transition to IMC can be met by simply eliminating all ASPA/PACE inspections and conducting SDLM/modification, corrosion, and paint program (MCAPP) on fixed schedules. However, this is considered a last resort after all other options are considered. The proposed process then has to be validated on a number of prototype aircraft as determined by the program office and type commanders. The validation stage gathers specific detailed data on the implementation, long-term costs and potential benefits, and IMC execution concerns.

After the validation process is completed, the second step requires individual program teams to seek final approval from N88 (via code N881) to change their maintenance concept and implement IMC across the entire platform. This step requires detailed cost figures, specific benefits derived from IMC, and a bureau number (BUNO) by BUNO baseline/transition plan. (NALDA, 2001)

D. IMC PLAN FOR EA-6B

NAVAIR 3.2 provided start-up funding for the program in fiscal year 1998 through an IMC initiative. Funding was increased to $2.4M annually from FY98 to FY02. During FY99, the IMC/RCM Level II Integrated Product Team (IPT), a multi-disciplined team, was chartered by PMA-234 to implement an RCM based IMC program. Training was held for team members on failure mode, effects and criticality analysis (FMECA)/RCM; from there, analysis is a continuous process throughout the life of the aircraft under the IMC maintenance program concept.

Documentation on the EA-6B aircraft service history is formidable and the failure history, though not as extensive, is fairly well recorded. Throughout the last thirty years, maintenance requirements were added to the initial deck based on failure occurrences and some degree of engineering analysis. What resulted is a MRC deck that is a culmination of malfunction documentation, not based on RCM data, but on when access to a particular panel makes the most sense during an inspection cycle. The end product is a huge laundry list of unjustified inspections and over-inspection of the aircraft as a whole.

It was decided early in the IMC concept exploration phase that the IPT would not change the world or reinvent the wheel, which meant the new program would be based on historical data and the maintenance program in place; changes or improvements would be made from there where necessary. Initial RCM analysis candidates were developed from items that had existing scheduled maintenance requirements, significant failure rates or that would potentially impact safety, aircraft availability or operating cost.

During the past three years, over 750 failure modes have been analyzed using the work unit code (WUC) manual, NAVAIR 01-250HD-8, in developing the hardware breakdown (Oglesby, 2002). The end result is an eight year IMC depot cycle, base-lined on the previous inspection cycles and phased maintenance interval field events (PMIF), that are actually supercharged ASPA inspections that occur biennially vice annually. (PMA-234, 2000)

It should be noted that the failure modes analyzed do not include the J52-P408 engine and related systems because there is a separate RCM program for engines. Other systems, such as the ejection seats or other system components that do not fall under the cognizance of the EA-6B Field Support Team (FST), will be coordinated where necessary, but are currently not under the IMC plan. Although a particular component may have equal impact in the readiness and availability of the aircraft, those components outside the scope of the EA-6B IMC maintenance plan will not be addressed in depth in this discussion or program analysis.

Once the objectives were clear, the program goals were presented to the fleet on 27 April 2000 (MCAS Cherry Point, 2000).

-Fixed PED.

-Decrease pipeline aircraft to meet the PAA of 106.

-Increase aircraft operational readiness.

-Maintain cost neutrality (as a minimum) with current maintenance program.

-Reduce year-to-year variability of maintenance workload.

-Improve overall material condition of aircraft.

-Maintain/improve structural integrity of aircraft.

-Reduce overall fleet maintenance burden.

-Develop RCM based preventative maintenance (PM) program.

Metrics used to monitor program goals are:

-Aircraft Inventory/PAA

-Cost using NAVAIR 4.2.5 Business Case Analysis (BCA) Templates

-Maintenance Manhours (MMH)/Flight Hour

-Aircraft Availability/Readiness

The IMC implementation plan, as depicted in Appendix B., shows the IPT Concept Implementation Meeting was held July 18-20, 2000, and the concept defined in August 2000. Concept definition consists of the following and is shown below:

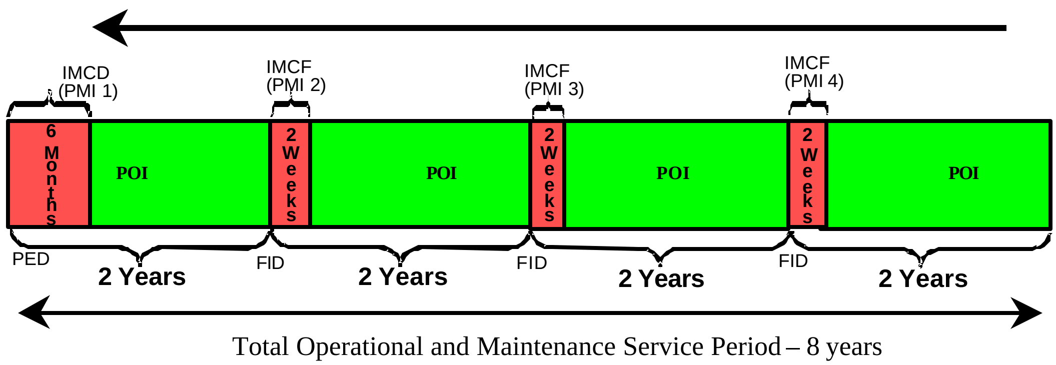

Figure 2. IMC Concept Definition

The total operational and service period will be eight years, divided into four two-year inspection cycles. Phased Maintenance Interval Depot (PMI1) begins with induction into the depot; that is when the clock starts. A goal of a six-month turn around time at the depot would then have the aircraft back in the fleet and ready to fly. (The six-month turnaround time is based on an aircraft that has been through at least one PMI field event cycle and has no modifications incorporated.)

Eighteen months later (a total of two years from the date of induction to PMI1), the aircraft is scheduled for PMI2, where the organizational level makes the aircraft ready for inspection and a depot field inspection team (DFIT) from NADEP Jacksonville inspects the aircraft and grades discrepancies as critical, significant and informational only, with the level of repair required annotated. The depot field repair team (DFRT) is then responsible for fixing the depot level discrepancies; the O-level is responsible for inducting I-level discrepancies, fixing organizational discrepancies and closing up the aircraft.

Four years from the original PMI1 date of induction, the aircraft is then due for PMI3 and six years later PMI4. The average out-of-service time for each field event is scheduled to be 14 calendar days. On the eighth year, the aircraft is inducted back into the depot for extensive disassembly, strip and paint, visual inspections, systems checks, non-destructive inspections (NDIs) and zonal inspections; again, with the goal of six months out-of-service time.

General considerations were taken into account when designing the PMI schedule including a consistent workload: no more than 15-16 aircraft per year in each phase; no more than two to three aircraft in work at any one field location at once; and impact was reduced on the existing infrastructure by minimizing overall hangar space requirements and organizational level support equipment (SE) utilization. (MCAS Cherry Point, 2000)

Scheduled maintenance under the IMC concept is designed to perform only those jobs that are RCM justified, which alleviates maintainers of performing unnecessary tasks and eliminates redundancy. As a result, organizational level maintenance is relieved of 2804 scheduled maintenance man hours previously performed on one aircraft in a year. A 364-day inspection cycle is implemented, which replaces the former 224/448 day inspections and includes many of the 28/56 day special inspection tasks. See Table 1 for a man-hour breakdown.

4 A/C Squadron over 2 Years									
Pre IMC					IMC				
Interval	Mhrs	Total Mhrs	TAT	Total TAT	Interval	Mhrs	Total Mhrs	TAT	Total TAT
14	26	2704	0.5	52	14	26	2704	0.5	52
28	93	4836	3	156	28	14	728	0.5	26
56	126	6552	5	260	56	11	572	0.5	26
224	194	2328	5	60	364	200	1600	5	40
ASPA	6	30	2	16	IMCF	109	436	14	56
Annual MHRS		16450		492	Annual MHRS		6040		148
Delta							-10410		-344

106 A/C over 2 Years									
Pre IMC					IMC				
Interval	Mhrs	Total Mhrs	TAT	Total TAT	Interval	Mhrs	Total Mhrs	TAT	Total TAT
14	26	71656	0.5	1378	14	26	71656	0.5	1378
28	93	128154	3	4134	28	14	19292	0.5	689
56	126	173628	5	6890	56	11	15158	0.5	689
224	194	61692	5	1590	364	200	42400	5	1060
ASPA	6	795	2	424	IMCF	109	11554	14	1484
Annual MHRS		435925		13038	Annual MHRS		160060		3922
Delta							-275865		-9116

Table 1. Availability/O-Level Workload

Another added benefit to the 364-day special inspection interval is that it is designed to marry up with when the PMI events are due. (If it is necessary, the 364 day can be re-based to give maintenance managers flexibility.) Redundancy in effort is even further reduced compared to the labor intensive ASPA inspection.

In October 2000, the Prototype plan was submitted for approval through the IMC Review Board; the Process was approved February 2001 for seven aircraft to become IMC prototypes. Four of the prototypes were located at Whidbey Island, two at Cherry Point and one at the depot, see Table 2.

Date	Event	Buno	Location
Feb 26	**IMCF2**	**163522**	**NASWI**
Apr 02	**IMCF2**	**163403**	**NASWI**
Apr 30	**IMCF4**	**163884**	**NASWI**
Jun 15	**IMCF2**	**163402**	**NASWI**
Jun 18	**IMCD**	**160786**	**NADEPJAX**
Jul 15	**IMCF6**	**162228**	**MCAS CP**
Aug 20	**IMCF2**	**161880**	**MCAS CP**

Table 2. FY 01 Prototype Schedule/Buno/Locations

VAQ-140 was selected to take the first four prototypes at Whidbey Island. The idea was to have the aircraft in one squadron to keep data as pure as possible and to isolate the prototypes from the SDLM aircraft. It also alleviated any confusion for the maintainers.

Scheduled prototypes go through the PMI process; a rigorous field inspection, and at that time are assigned a biennial period; either 2, 3 or 4 years based on the last SDLM induction. In addition, new RCM based maintenance requirement cards (MRCs) are used for all preventative maintenance actions on the aircraft. (An RCM based phase deck is scheduled to replace the current phase deck in the preventative maintenance program on the prototype aircraft in the August 2002 timeframe (Ogelsby, 2002).)

All other aircraft remain on the current MRC cycle until they are due a 224-day inspection. Upon completion of the scheduled inspection, the most manpower intensive in the current MRC cycle, the aircraft are formally switched over to the new RCM based MRC's, but are still considered SDLM aircraft until a PMI field or depot event is completed (Barry, 2002).

The original schedule had full transition to IMC slated for early FY02, but the prototype schedule was delayed due to an OPNAV requirement for a material condition review. There were also delays in the FY01 prototype funding and inductions, so the revised plan changed the original 30 aircraft (17 at Whidbey) scheduled for full implementation in FY02 to become prototypes instead (see Table 3.)

The schedule was changed to FY03 for full implementation. However, as of this writing, the schedule has slid to early FY04 to allow the OEM, Grumman, to also induct and complete a prototype. The scheduled number of aircraft prototypes for FY 03 is: 11 Marine, 27 Navy, three Reserves and three depot/OEM inductions. There will still be nine aircraft scheduled for SDLM that year (Hayes, 2002.)

•SDLM	IMCF 2	IMCF 4	IMCF-6	IMCD
•158030	163525	158033	162936	158801
•158542	156481	158800	162228	161243
•158802	160436	160433	164403	163400
•159584	163886	160707	158816	
•159911		160788	159583*	
•160437		161118	161115	
•161350		161775	161119	
•161779		161882	161242	
•162938		162227	163395	
•162939		163396	163398	
•163031		163399		
•163032		163404		
•163047		163521		
•		163891		
•		164401		
Total•		164402		
13	4	16	10	3

Table 3. Scheduled Prototype Aircraft FY02

* Note: 159583 lost to mishap December 2001.

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III. ANALYSIS OF IMC AFFECTS ON MAINTENANCE LEVELS

A. DEPOT LEVEL

Figure 3 NADEP Jacksonville, Florida (March 2002).

1. Depot Site

IMC directly impacts the depot in numerous ways. It is the vehicle for reducing overall aircraft operating and support costs and, as envisioned by NAVAIR, a large amount of airframe maintenance normally performed at the depot site will be performed at the operating site. This reduces workload for the depot. However, the Jacksonville EA-6B depot team does not view IMC as a threat to their livelihood. It is viewed as a change they will adapt to.

When the IMC concept was first introduced to EA-6B depot management, they were resolved to help meet the following goals:

-cost neutrality

-product improvement (leading to increased readiness)

-depot level maintenance stays depot level maintenance (no transfer of responsibility to a lower level)

-no redundancy if possible

These goals played a key role in how the maintenance plan is drafted today.

The EA-6B depot line has historically had 100-120 people working on the depot's aircraft, but has had to increase manning to approximately 150-180 technicians because of scheduled aircraft modifications and SDLM/IMC. The average age is around 46 years old, as with all depots. Most employees have had either EA-6B, A-6 or some other prior aircraft maintenance experience. As time passes and people become retirement eligible, it is a valid management concern that a lot of corporate knowledge will be lost. To counteract the affects of an aging workforce, program management is constantly on the lookout to hire, when authorized, to maintain their core capabilities (Hood, 2002).

Management was asked if they anticipate maintaining current employment or will there be a substantially decreasing workload after the full transition to IMC is completed. The response was that current employment would be justified with the modifications scheduled at least until 2008 and possibly throughout the life of the aircraft. The man-hour reduction in workload between SDLM and IMC aircraft will be offset by scheduled concurrent modifications. A positive change with the IMC program is that depot inductions are scheduled and it will be easier to plan for the workload; in the past, the workload was unpredictable because it was based on ASPA failures (Pearce, 2002.)

Comparing SDLM (NAVAIR, 2000) and IMC (IMC Draft, 2000) specifications make them appear quite similar to one another. The last few revisions of the SDLM specifications have made its requirements much like that of IMC. Many of the changes are subtle, but the biggest ones include: transferring the main landing gear from a SDLM requirement to a ten year scheduled removal at the fleet and deleting the DITMCO test and evaluation from the IMC specification. Both changes are RCM justified, however, they do two things, take away work from the depot and place the burden on the sailor's backs.

The main landing gear overhaul will be done in ten-year increments, vice every depot induction, and is something the organizational level will have to manage. There is only one set of dummy struts stationed at NAS Whidbey, however, the strut is listed on the consolidated remain-in-place list (CRIPL) and does not have to be turned in until a replacement is available. Wing Maintenance does not view the change as a negative impact on the squadrons (Bunch, 2002.)

DITMCO is a huge piece of test equipment **(Fig #)** that all of the aircraft systems are plugged into and checked. The test set checks for wiring continuity, insulation resistance, dielectric breakdown and inductance. It also tests for the proper operation of resistors, relays, diodes, capacitors and circuit breakers. Hooking up the aircraft to the test set is a time consuming process and requires experienced technicians. Once the aircraft is plugged in, it takes an average of five weeks for a complete wiring check. By removing DITMCO from the depot specification, the only time an aircraft will get a full systems check is if it is going through a major wiring modification, for example, the Block 82-89A upgrade. Otherwise it is not done (Pearce, 2002.)

RCM analysts believe DITMCO has the potential to induce problems into systems by plugging and unplugging cannon plugs, stretching wire bundles or human error, such as bent pins. This disqualifies it from being a RCM justified maintenance action (Oglesby, 2002). The budget cutters see deleting DITMCO has a huge cost savings. It will reduce turn around time by over a month per aircraft.

Figure 4 DITMCO Test Set

The depot views deleting the test as a potential maintenance liability and cost driver to them and the fleet. Flight control and safe for flight systems checks are not performed until the aircraft has almost completed the IMC process. If a problem is detected at that time, the depot's artisans have to troubleshoot the particular system. If the problem is something complicated to isolate, the time saved by not performing DITMCO on the aircraft can easily be eaten up trying to identify what is wrong with the system. Had it gone through DITMCO, the problem could have been identified and fixed early on with no change in the scheduled delivery of the aircraft (Hood, 2002.)

The fleet just wants the aircraft systems to work. If not DITMCO, than at least turn on and operationally check all of the systems to verify they work properly (Bunch, Gibbons, 2002.) Right now, as the specifications are written, only safety of flight systems, such as flight controls and those listed in the MESM as downing discrepancies, are checked to verify proper operation.

Mission systems, such as armament, ALQ and USQ, are not part of the specification and not even turned on. This places a huge workload on the squadron receiving the aircraft from the depot. If there is a problem with the aircraft, it could take months to troubleshoot and fix the discrepancy. Worst case, the squadron will live with it because they lack the technical expertise or proper test equipment when it could have been fixed at the depot in a fraction of the time.

Another point to be made with EA-6B IMC is that it does not change the level of maintenance the depot can perform. Organizational maintenance still cannot be performed at the depot, just as with the SDLM program. Noted-But-Not-Corrected (NBNC) lists will still accompany the aircraft to the squadron, just as they have in the past. NBNC lists can be quite lengthy and burdensome for the fleet; however, the depot is not authorized to perform the maintenance, so when an aircraft is delivered to a fleet squadron it is accurate to say that it is never full mission capable (FMC).

So far, two aircraft have been inducted into the depot for PMI 1 as prototype aircraft. The first, BUNO 160786, was inducted 18 June 2001 and completed 9 April 2002. BUNO 158801 was inducted 14 November 2001 and is currently going through the IMC process. The disparity in predicted six month out-of-service goal and actual IMC completion dates for the first prototype can be attributed mostly to process expectations versus actual execution. Furthermore, the aircraft had not been IMC base-lined in the fleet, so sealant, corrosion preventative compound (CPC), etc. had not been applied to the aircraft. The aircraft was a true representation of the material condition of the aircraft coming from the fleet for depot overhaul.

BUNO 160786 is not going to be returned directly to the fleet because it is scheduled for a follow-on Block 82-89A modification. The fleet will not see an IMC1 aircraft until late 2002. At least the first two IMC prototypes will have back-to-back IMC/modification to get a true picture of how long an IMC event takes. In the future, IMC/modifications will be scheduled concurrently to reduce TAT and maximize aircraft availability to operational units.

Overall, the EA-6B depot production manager views IMC as a good thing and welcomes the change. The added benefit to be able to schedule aircraft inductions, improved material condition of the aircraft and a busy modification schedule outweighs the loss of depot rework in transitioning from SDLM to IMC specifications (Pearce, 2002.)

Figure 5 First EA-6B IMC Prototype, BUNO 160786

2. Field Site

In-service-repair (ISR) teams are satellite detachments supported by the regional depot. The Navy has three Aviation Depots (NADEPs) in the United States: San Diego, California; Jacksonville, Florida; and Cherry Point, North Carolina. The NADEPs all fall under the same auspice, however they compete for funding. It is a political process where aircraft located west of the Mississippi are supported by the San Diego NADEP and aircraft east of the Mississippi are supported by the Jacksonville NADEP. Funding is divided between the depots in this manner regardless of where the subject matter expertise for a particular aircraft is located.

The Whidbey Island ISR team currently consists of a team leader, four full time artisans and two temporarily assigned from San Diego. They provide depot level support to the I-level and aircraft assigned to the station, mainly EA-6Bs and P-3s.

With the implementation of IMC and the PMI field events, the ISR team also became the DFRT team. At that time there was an understanding that the ISR team would be augmented with permanently assigned artisans from San Diego. This was to help in taking on the additional workload the field events would place on the team (Bonnet, 2002.)

Unlike ASPA inspections that were performed by a permanently assigned artisan from San Diego, a DFIT team that is stationed out of Jacksonville, Florida performs PMI inspections. The field events are much more complex than the ASPA inspections and involve more challenging and complex repairs. TAT for the first 14 completed field events ranged from 13 to 23 days, an average of 19.2 days to complete the inspection, repair and return to service. The preliminary estimate for a PMI event was 14 days. Cost estimates were predicted to be $42,000 for depot and $1,786 for O-level consumables. Actual costs for the first eight events averaged $30,927 and $2,330 for D and O-levels, respectively (Boone, 2002). See Table 4 for individual breakdown.

PROTOTYPE	First	Second	Third	Fourth	Fifth	Sixth	Seventh	Eighth	Average
	LABOR/TRAVEL/MATERIAL COSTS								
DFIT	$17,782	$17,782	$17,286	$22,023	$21,796	$20,227	$21,576	$24,939	$18,158
DFRT	$13,010	$11,224	$20,249	$20,249	$2,620	$16,749	$17,784	$6,105	$12,000
Depot Material	$364	$315	$1,729	$842	$1,473	$1,479	$565	$165	$771
Total Depot Costs	$31,156	$29,321	$39,264	$43,114	$25,889	$38,455	$39,925	$31,209	$30,927
O Level Material									
Consumables	$1,786	$9,227	$915	$330	$3,583	$34	$4,299	$792	$2,330
Repairables	$38,696	$96,520	$98,320	$0	$30,890	$70,490	$0	$0	$37,214
Total O level Material	$40,482	$105,747	$99,235	$330	$34,473	$70,524	$4,299	$792	$39,543

Notes:
Prototypes 1,5,6: O-level repairables include items turned into AIMD for repair. This reflects AVDLR costs if BCM'd.
Prototype 7: Port horizontal stabilizer and starboard inboard flap assembly were repaired by DFRT on aircraft.

Table 4. IMCF Prototype Costs

With this increased workload, the ISR/DFRT has been tasked to the maximum extent possible. They have been working seven days a week since November 2001, and the team did not receive support from NADEP North Island until March 2002. That support came in the form of temporary vice permanent personnel. The mentality of the temporarily assigned personnel is temporary; however, the workload is permanent.

As with the depots, the ISR team is also made up of an aging workforce. On the permanent team the youngest artisan is 46 and the oldest 69. Working seven days a week has been possible because of the workforce's mentality in keeping the fleet flying; however, it cannot continue indefinitely.

Finally, to add to their already incredible workload, the ISR team is doing O and I level repairs on many of the airframe components. This reflects lack of structural knowledge and manpower at both the O and I levels and is addressed in greater detail in the sections that follow.

B. INTERMEDIATE LEVEL

Based on FY 2000 projections, the I-level will initially be inundated with failed flight control surfaces: FY 01-41; FY 02-246; and FY 03-264 (July Meeting, 2000.) Currently these predictions have not come to pass. However, if they do, the I-level will not be able to support such failure rates. There are across the board manpower shortages at the AIMD. Despite the fact an increase in personnel has been justified and approved, end strength manning levels do not allow the billets to be filled. Specifically in the airframes work center, the Activity Manning Document (AMD) authorizes 41 personnel in the AM ratings, but because of current manning levels, the AIMD Enlisted Distribution Verification Report (EDVR) dated 2/19/02 lists basic allowance (BA) and Navy manpower (NMP) at 39 and 32 respectively. There are 35 sailors currently on board (COB) with only 30 in the work center projected on board nine months out (POB9). These sailors support the entire air station's I-level airframe repair requirements (Kellow, 2002.)

Knowledge is also lacking in the AIMD for basic structures repair. This can be attributed to both training and experience. The on-site depot level field team provides repair capability if it is beyond the AIMD's capability. Of the flight surfaces that are inducted into AIMD, it was predicted that annual BCMs beginning 2001 would total 36, 198 and 215, respectively. AVDLR costs will potentially skyrocket, however the requirement for replacement flight control surfaces will have to be filled.

There has also been discussion to set up a contract field team (CFT) to augment the work center's affected by the surge in flight control surface failures, but nothing concrete has been set up.

The increase in expected demand for replacement flight control surfaces has arisen because a tap test has been added to the PMI events that was not part of the ASPA inspection. Furthermore, there is no historical demand/usage data on flight control surfaces (flaps, slats and ailerons). Repairs have not been by the book: 1-order the part; 2-AIMD inducts the part and either repairs it, does a P&E request for the local ISR to fix it or it gets BCM'd. Instead, the ISR would repair a flight control surface that was deemed bad without a P&E request, because the AIMD felt it was not necessary at the time. This practice no longer occurs, but the result is that there was a lack of documented usage; "F" condition assets were sent to the NAVICP warehouse where they sat and were not turned in to the depot for repair.

Once the problem was identified, the RCM team from Veridian went to NAVICP. Out of over 600 assets, they identified 418 salvageable repairable parts. Relying on the RCM analysis team's predications, NAVICP has agreed to fund the restoration to "A" condition based on projected demand vice actual. The assets are currently being cycled through the depot in small batches and replaced on the shelf as ready for issue (RFI) (Oglesby, Bunch, 2002.)

By the end of FY 04, all EA-6B aircraft are scheduled to be under the IMC program and employing the new inspection processes, by then defective flight control surfaces should be identified and corrected. At that point, the amount of I-level inductions should level out to a minimal amount.

The potential for other critical high failure items to be identified as the aircraft systems age is inevitable. Once identified, they must be dealt with in the most effective and efficient way possible. RCM analysts are predicting hydraulic reservoirs to be next on the horizon.

Overall, the I-level is skeptical of the IMC program. Many view it as a huge surge in a workload for which they are not manned. RCM analysts say it is short term and will level out once all of the aircraft have cycled through the first PMI (Shilito, 2002).

C. ORGANIZATIONAL LEVEL

1. Military

There are 16 squadrons stationed at NAS Whidbey Island, WA (including the training squadron and pre-commissioned squadron that does not have aircraft) with a total of 72 aircraft assigned. This number does not include the seven aircraft assigned to squadrons that are undergoing depot maintenance either at Jacksonville or Saint Augustine.

VAQ 129, the training command, has 17 aircraft and the rest are divided up between the 14 operational squadrons each having no more than four aircraft at a time (unless in between aircraft transfers and acceptances).

The aircraft is labor intensive to maintain. When it was first introduced to the fleet and until the late eighties, maintenance man-hours per flight hour (MMH/FH) averaged around 30 hours. In calendar year 2001, the Wing averaged 60.9 MMH/FH with averages per squadron ranging from 44.3 to 106.1 MMH/FH. (See Appendix C for complete breakdown.)

The first IMC results were formally reported to the fleet at the annual Maintenance Action Group (MAG) meeting, August 2001. VAQ 140 had been tasked to be the initial prototype squadron and had been on the new MRC deck since March. The maintenance officer gave a very positive brief on his squadron's experience with the IMC. When he told of a 65 percent decrease in scheduled maintenance requirements, the fleet responded with initial doubt, but as the numbers were displayed on actual times for scheduled maintenance inspections, they became very interested. For example, a 56-day special inspection that used to take three days had been pared down to one eight-hour shift to complete (figure 6). This alone was a huge scheduling burden lifted off of the maintenance manager's shoulders, let alone relief for the maintainers (Brabner, 2001.)

Figure 6. VAQ 140 Presentation, MAG meeting, August 2001.

The Wing was and continues to be very "pro" IMC/RCM. They have also been very organized in implementing the program. They did a great job in selling the program and getting the squadrons on board. Choosing one squadron as the prototype and having them present their results at the 2001 MAG meeting was a terrific selling point. In addition, transition to IMC was made easier because documentation procedures that minimized confusion were put in place early on in the prototype process. Together these played a key role in gaining support from the fleet; which overall has been positive.

However, there is a trade off. The new MRC deck saves a lot of time and the aircraft are more available, but during the biennial depot field events the maintainers are required to do more than required by an ASPA. The inspection team goes into more depth, such as tap testing every flight control surface, identifying worn bushings and splices, etc.

The 364-day special inspection is the most labor intensive of the special inspections. Panels that have not been opened for a year, that were normally opened during a 28-day inspection, may hold some surprises. VAQ 140 completed the very first

364-day prototype inspection in March 2002, while on cruise on the JOHN F. KENNEDY (CV-67). It took seven days instead of the predicted five days to complete; though part of the time can be attributed to getting hangar space. There were no surprises when the panels were opened; optimistically, this is good sign that the aircraft have been over-inspected in the past and RCM based maintenance works (Pirosek, 2002.)

Overall, the fleet maintainers like the new MRC deck. But, they are, a bit leery about whether we are now under-inspecting the aircraft. They have been conditioned to a 56-day special inspection that lasts five days; and signing it off in two shifts almost seems like cheating (Surveys, 2001)

One negative aspect of IMC viewed by maintenance managers is the fixed PED/PMI . They are used to the nine-month ASPA inspection scheduling window; now it will require closer monitoring to schedule the PMI events. With IMC, there is a three-month window. The inspection can be pulled two months early or not done until the very last day of the month when the PED/PMI is due. Some managers feel that a three-month window does not give them the flexibility they need to schedule such a major inspection. If deployed when the inspection is due, waivers will be considered. Ideally, an inspection team will be brought in to perform the inspection. However, if there is depot repair to be done, it could mean the aircraft would be grounded until qualified repairs can be made. How that will be resolved is still in the process of being worked out.

The Navy EA-6B Configuration manager and fleet maintenance managers are also concerned because the fixed PED is based on the induction date of the aircraft going in for PMI, vice the date it is released from the depot. Based on the induction date, the time starts ticking toward the next inspection before the fleet even sees the aircraft. With modifications done in conjunction with PMI1, an aircraft will feasibly remain in the depot for over a year; the aircraft would be due for PMI2 after less than one year back in the fleet (Johannsen, 2002.) However, RCM engineers argue, that the aircraft never stops aging and therefore the induction date is justified. (Ogelsby, 2002)

There may be some relief with the current PED system. Right now what is driving the eight year scheduled depot induction is the RCM paint analysis. If another type of paint can be used that lasts longer or the paint used right now is not applied until the end of the depot visit, than PMI2 can possibly take place three years after depot induction vice two. The PED would than be at nine year intervals vice eight. That concept has yet to be approved by RCM analysts. (Hayes, 2002)

Bottom line is that the aircraft will be in the fleet for at least eight years without a depot visit. Organizational level maintenance personnel and the ISR will be tasked to perform any maintenance action required on the aircraft. PMI field events will be corrected on site. It will be a rare occurrence, if ever, that an aircraft will be sent to the depot for repair during the field events.

2. Contracted Field Team (CFT)

With MMH/FH doubled in the last ten years, and manning levels unchanged, the squadron's maintenance workload has been huge. The worst hit is the training command, VAQ 129. Getting student aviators qualified in the aircraft in a timely manner has become increasingly difficult. Jets were not available because of the scheduled maintenance burden and the increase in non-mission capable discrepancies. When the aircraft are flying; life is drained from them by continuous hot pump/crew switch evolutions.

In November 2000, relief finally came to the training squadron in the form of a 21 man Raytheon CFT. They perform the scheduled maintenance while squadron personnel work on downing discrepancies, the flight line and man training detachments. The squadron was able to log over 8,500 flight hours in FY 2001, and catch up on the aviator backlog. In FY 2002, the CFT dropped to 19 personnel, but they continue to play a critical role in the success of the training command. Wing Maintenance supports continuing the CFT role despite the decline in scheduled maintenance actions. Raytheon still provides the consistency needed to maintain squadron readiness and aircraft availability at the highest possible level (Berry, 2002.)

D. IMC AND EA-6B READINESS

Despite the fact there has been a 65 percent decrease in scheduled maintenance requirements after implementing IMC, there is no significant difference in readiness between the prototype squadron (VAQ 140) and the rest of the fleet squadrons. There is also no obvious difference between squadrons with prototypes and those without. (Appendix C).

A huge readiness degrader that is devastating current EA-6B readiness and was not addressed earlier in the paper because it is not part of the EA-6B IMC program are the J52-P408 Pratt and Whitney engines. They have been failing at an incredible rate. Two aircraft were lost late last year due to catastrophic engine failures that caused both crews to eject from the aircraft. Since that time, the fleet has been on five-hour engine oil samples with no relief in sight. As of this writing, the training command has 21 bare firewalls.

With the direct impact the engine plays in readiness, it is difficult to measure whether the IMC program has positively affected the fleet.

Theoretically, as material condition improves by replacing flight control surfaces and other readiness degraders, there should be an increase in readiness and aircraft availability. Maintenance actions based on RCM analysis will result in substantially fewer hours than were once devoted to scheduled maintenance time; this will equate to increased aircraft availability for the flight schedule.

Unfortunately, the aircraft will continue to age and realistically there will always be something unexpected that fails and negatively impacts aircraft readiness and availability. Those that will be directly affected are the operational units, the training command and most likely the ISR team. One way to counteract or at least neutralize the potential negative impacts are to continue to aggressively analyze failure modes as soon as they start to appear, to possibly head off a catastrophic failure or readiness degrader. Another is to ensure training is available so that failures can be recognized early in the inspection phase and during a corrective maintenance evolution and thoroughly documenting the failure is annotated on the MAF.

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IV. CONCLUSIONS AND RECOMMENDATIONS

A. INTRODUCTION

Research conducted in support of this Thesis evaluated how the transition from SDLM to IMC prototype has been accomplished. It addressed how IMC is incorporated on the aircraft, current and projected readiness levels and support issues. This Thesis also examined current attitudes towards IMC implementation from several perspectives, including management and maintenance personnel at all echelons. The main objective of this thesis was to determine whether implementing the IMC program on the EA-6B aircraft is beneficial.

This chapter identifies conclusions and recommendations for managing the IMC program. These conclusions and recommendations are a result of analysis of background research, meetings and personal interviews. Finally, this thesis concludes by providing recommended areas for further study.

B. CONCLUSIONS

Overall the research has determined that implementing the IMC program based on RCM analysis to support preventative maintenance actions on the EA-6B platform is beneficial. Specific conclusions drawn from the research follow.

1. ISR cannot continue status quo to support ISR and IMC field events. The current manning level compared to the demand for depot repair has had the team working seven days a week for several months. Temporarily assigned artisans are not going to benefit the team either in the short or long term. Short term solutions only bandage what is a permanent workload.

2. Despite the fact that readiness levels have not increased in the short term, redefining maintenance tasks makes scheduled inspections more realistic than in the past. Many maintenance requirements were based on an event that engineers deemed necessary to implement a permanent inspection. Requirements for the inspection were then decided upon based when in the scheduled inspection cycle the panel or area was already being inspected. It was not based on RCM data. What resulted was an over-inspection of the aircraft. The RCM based preventative maintenance program is a more realistic approach to inspecting the aircraft.

3. The airframe will continue to age and there will always be another readiness degrader that was not anticipated. This is a result of tired iron and aging systems. As the aircraft continue to deploy to the boat and maintain a rigorous deployment cycle, the aircraft will experience failures not seen before.

4. The six-month out-of-service period and turn around from a PMI1 event will not be achieved until the aircraft has completed one full PMI cycle and the modification/upgrade schedule is completed. Even if the IMC and modification is done concurrently, just by the shear complexity of the job, many modifications take over six months to complete alone. In addition, corrosion and material condition improvements are not predicted by RCM analysts to be realized until after an aircraft completes a full PMI schedule.

5. The majority of the depot level repair will be done at the operational site. The aircraft is scheduled to go through three depot level field events and be in the fleet eight years before returning to the depot for paint and condition inspections.

6. Upon receiving an aircraft from the depot, there will continue to be a NBNC list, as in the past. The depot level is not authorized to perform organizational level work without approval, or incorporate technical directives if they are not stipulated in the contract.

7. Aircraft scheduling is predictable with IMC. This is a result of a fixed PED and will allow budgeters and planners to schedule depot inductions.

8. Many IMC program goals have not been realized in the short term:

-fixed PED. Eight year depot induction divided into three biannual field depot events.

-Maintain cost neutrality with the current maintenance program. Average projected budget costs have been met.

-Improve overall material condition of aircraft. This was evidenced by squadron prototype, VAQ 140’s, 364-day inspection.

-Reduce overall fleet maintenance burden. Scheduled maintenance has been reduced by 65% and probably should have been reduced long before implementing IMC.

PMI field events have the potential to increase the maintenance burden during those inspection cycles.

Develop RCM based PM program. Completed and to the fleet with ongoing analysis and revision.

It is too early in the program to realize an increase in aircraft inventory/PAA, except that scheduling is facilitated with a fixed PED. This will increase forecasted PAA.

MMH/FH are still double what they were twelve years ago, including the prototype squadron.

Aircraft availability and readiness numbers have been skewed due to the high engine failure rate.

9. Knowledge to identify and repair structural parts is lacking in both the O and I-levels. This is due to the lack of training and experience in structural repair.

!0. Manning at the O and I-levels is inadequate. MMH/FH have doubled in the last 12 years, yet manning levels in the O-level have stayed the same. The I-level needs to be manned at AMD numbers vice BA/NMP.

C. RECOMMENDATIONS

1. The IMC program will not be successful if the ISR team is not fully manned and supported. In order for PMI field events to be successful and aircraft readiness/availability to increase, NADEP North Island has to provide permanent manning to the NAS Whidbey ISR team. If they don't, then there has to be a procedure put in place where the team leader can hire local talent or task NADEP Jacksonville for manning.

2. For the program to succeed at the operational level, maintenance management must fully support IMC and the MRC's derived from RCM analysis. To maximize the new maintenance concept's effectiveness, maintenance management must ensure that when a technician enters a space or opens a panel to perform corrective maintenance or FOD inspection, that the 18-inch rule applies. The entire area must be inspected for FOD, corrosion, degradation in hardware, obvious failures, etc. and fixed before securing the area. At least generate a MAF if time does not permit the appropriate maintenance action right then. A clean-as-you-go mentality must be instilled in every maintainer.

3. Documentation at the organizational level must be concise and clearly describe a failure so that RCM analysts are able to perform accurate FMECA analysis. This will identify potential readiness degraders before they become a detriment to aircraft availability and supportability.

4. A six month TAT out of the depot will not be realized until after 2008. Until then, organizational maintenance must be by-the–book when it comes to maintaining the aircraft so that it is a realistic goal.

5. There needs to be a contingency plan in place so that an aircraft can be sent to the depot prior to PMI1 if necessary. An aircraft in such a condition should not have to be the burden of the squadron and ISR to repair.

6. Current legislation does not allow organizational maintenance to be performed on aircraft undergoing depot level maintenance. Without a change in the system, the squadron will continue to receive NBNC lists.

7. A PMI field event can be waivered if necessary. Inspection teams need to be funded to go to forward deployed sites. There also has to be procedures in place to allow the inspection team to repair at forward deployed sites if necessary.

8. Time will tell whether program goals are realistic.

9. Training must become a priority. Currently a majority of airframes personnel do not have the knowledge required to recognize a failure or perform correct repairs. NATEC expertise and NAMTRAGRUDET must be utilized to the fullest extent possible.

10. Manpower reviews need to be performed in the squadrons to re-baseline manning to match the current workload. AIMD needs to be manned at AMD numbers, not BA or NMP.

D. RECOMMENDATIONS FOR FURTHER STUDY

1. Cost/benefit analysis done on the value of DITMCO. The use of the test set, DITMCO, was not justified by RCM analysis, however the fleet may not have the expertise or the capability to fix something that could have been easily identified and troubleshot using the test set.

2. IMC program analysis on the J52-P408A engine. The engine has been failing at an incredible rate, and two catastrophic failures in the last seven months has led to the operational units doing five hour engine oil samples. Readiness has declined as a result of the failures.

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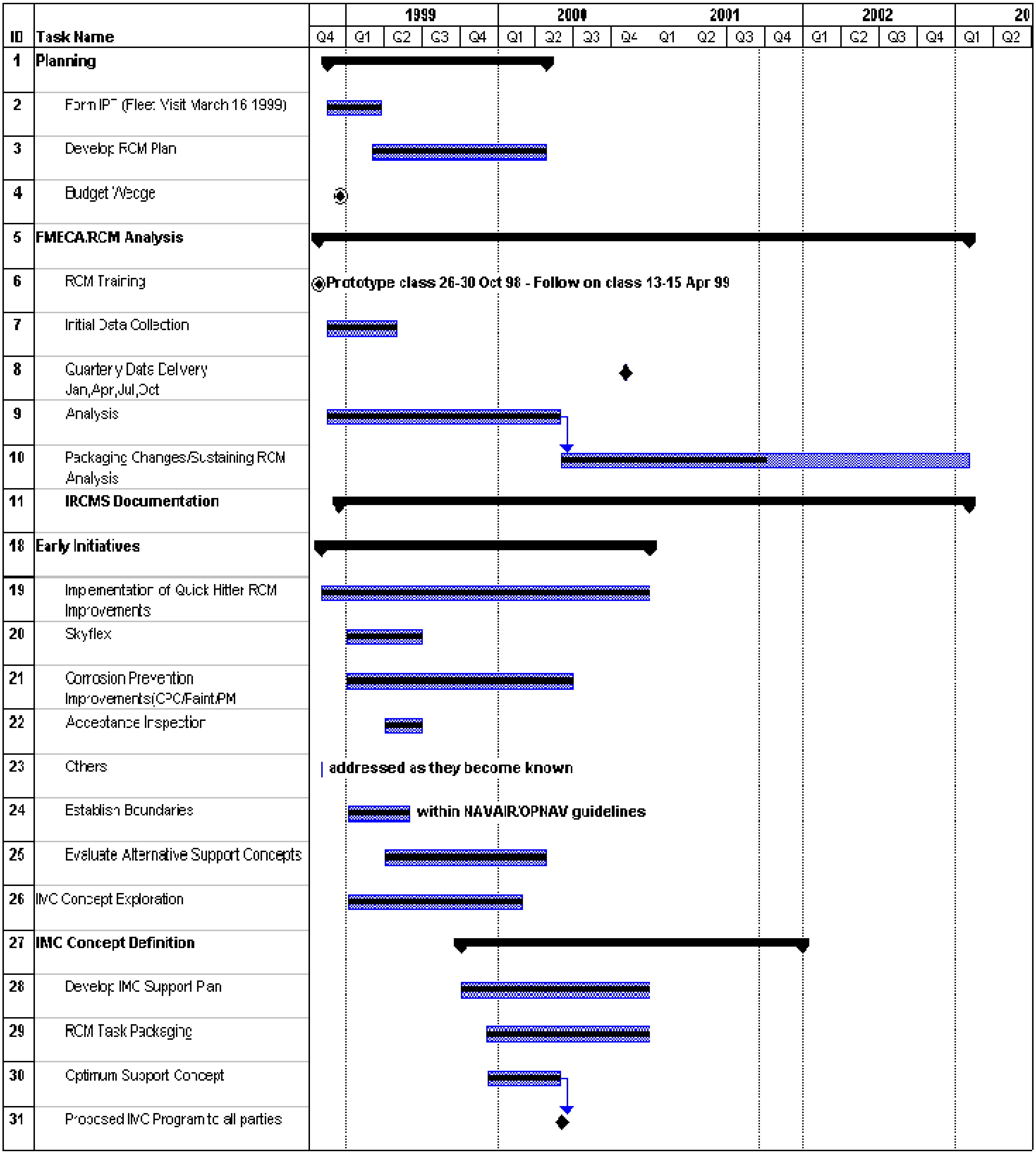
APPENDIX

A. LIST OF ACRONYMS

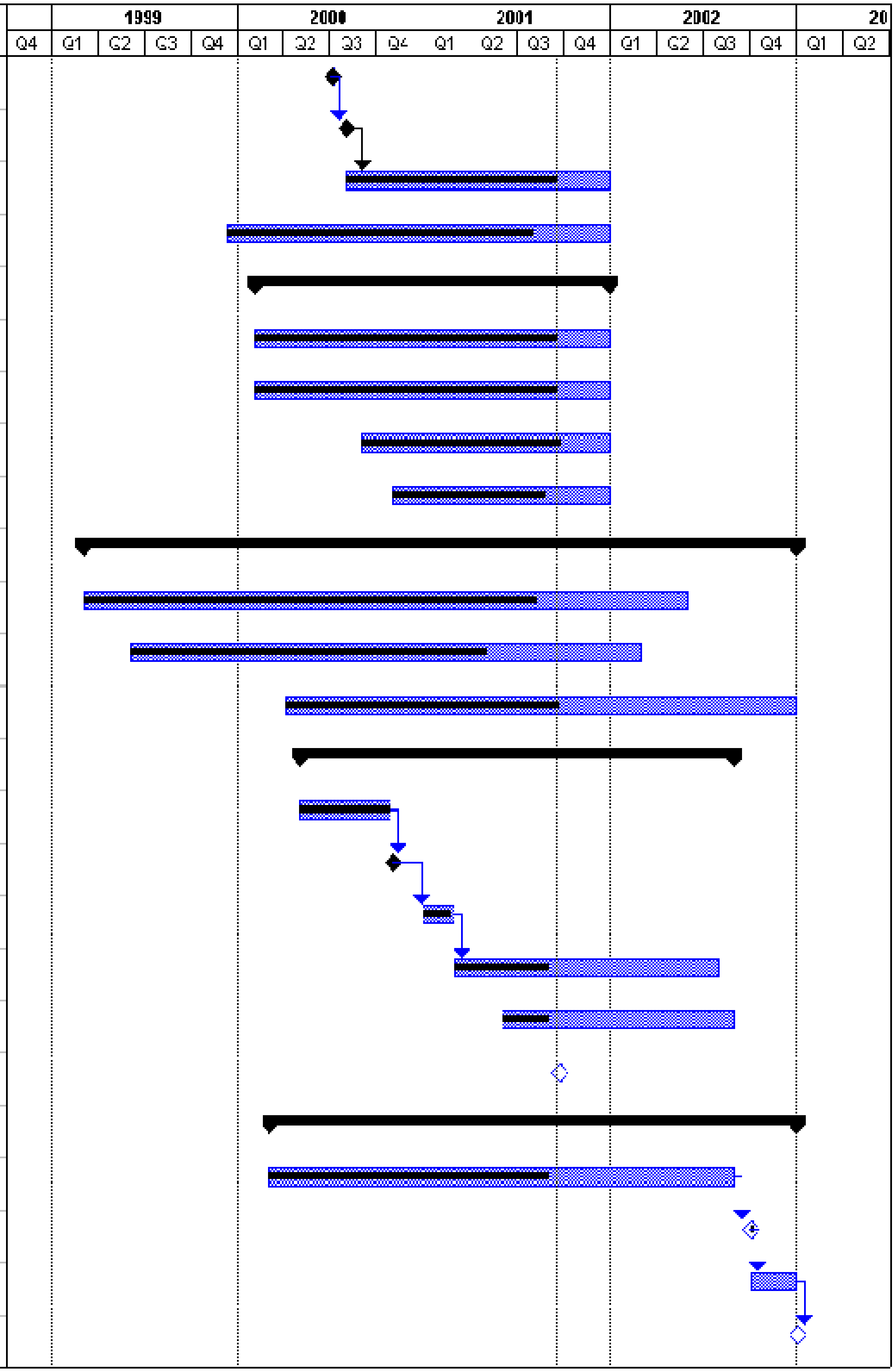
AMD	ACTIVITY MANNING DOCUMENT
ASPA	AIRCRAFT SERVICE PERIOD ADJUSTMENT
BA	BASIC AUTHORIZATION
BAA	BACKUP AIRCRAFT AUTHORIZATION
BCA	BUSINESS CASE ANALYSIS
CFT	CONTRACT FIELD TEAM
CNO	CHIEF OF NAVAL OPERATONS
COB	CURRENT ON BOARD
DFIT	DEPOT FIELD INSPECTION TEAM
DFRT	DEPOT FIELD REPAIR TEAM
DON	DEPARTMENT OF THE NAVY
EDVR	ENLISTED DISTRIBUTION VERIFICATION REPORT
FLE	FATIGUE LIFE EXPECTANCY
FMC	FULL MISSION CAPABLE
FMECA	FAILURE MODES, EFFECTS AND CRITICALITY ANALYSIS
FST	FIELD SUPPORT TEAM
FYDP	FUTURE YEARS DEFENSE PROGRAM
IMC	INTEGRATED MAINTENANCE CONCEPT
IPT	INTEGRATED PRODUCT TEAM
MAF	MAINTENANCE ACTION FORM
MAG	MAINTENANCE ACTION GROUP
MCAP	MODIFICATION, CORROSION AND PAINT PROGRAM
MMH/FH	MAINTENANCE MANHOUR PER FLIGHT HOUR
MRC	MAINTENANCE REQUIREMENT CARD
NAVAIR	NAVAL AIR SYSTEMS COMMAND
NBNC	NOTED BUT NOT CORRECTED
NDI	NON-DESTRUCTIVE INSPECTION
NMP	NAVAL MANPOWER
OEM	ORIGINAL EQUIPMENT MANUFACTURER
OOS	OUT OF SERVICE
OSP	OPERATING SERIVICE PERIOD
PAA	PRIMARY AIRCRAFT AUTHORIZED
PACE	PAINT AND CORROSION EVALUATION
PED	PERIOD END DATE
PM	PREVENTATIVE MAINTENANCE
PMI	PHASED MAINTENANCE INTERVAL
PMI1	PHASED MAINTENANCE INTERVAL DEPOT
PMIF	PHASED MAINTENANCE INTERVAL FIELD
POB9	PROJECTED ON BOARD NINE MONTHS OUT
RCM	RELIABILITY CENTERED MAINTENANCE

SDLM	STANDARD DEPOT LEVEL MAINTENANCE
SE	SUPPORT EQUIPMENT
TAA	TOTAL AIRCRAFT AUTHORIZED
TAI	TOTAL AIRCRAFT INVENTORY
WUC	WORK UNIT CODE

B. IMC IMPLEMENTATION PLAN



ID	Task Name
32	IFT Concept Implementation Mtg Jul18-20
33	IMC Concept Defined
34	Concept Refinement
35	Prepare NAVAIR 4.2.5 Templates
36	**IMC Documents Development**
37	Depot Level Specifications
38	C/I MRC Deck
39	IMC Work Package
40	Depot Process Modeling
41	**Integrated Logistics Support**
42	Supportability Analysis (All ILS Elements)
43	Lay In Logistics
44	Publications
45	**Prototype(s)**
46	Execution Plan Development
47	IMC Review Board Submit Prototype Plan for Approval Oct/Nov
48	Process Approval
49	Perform Prototype(s)
50	Evaluate Results/Make Adjustments
51	Gain Approval for Additional Prototypes
52	**Implementation**
53	IMC Implementation Plan
54	IMC Review Board Submit Implementation Plan for Approval
55	Process Approval
56	Execute IMC



C. CVWP 2001 3M SUMMARY

	129	128	130	131	132	133	134	135	136	137	138	139	140	141	142	AVG
PERCENT MC	48.6	77.2	65.7	47.8	59.3	79.1	67.1	64.2	52.5	65.7	53.6	62.9	64.4	59.1	61.9	61.9
PERCENT FMC	30.0	68.2	48.3	3.0	45.8	59.9	45.3	44.3	17.2	43.8	24.7	41.2	45.2	20.1	46.8	36.6
PERCENT PMC	18.5	9.0	17.2	45.3	13.5	20.9	21.8	19.9	35.3	22.0	28.8	21.7	19.2	37.5	15.0	25.3
PERCENT NMC	50.6	22.8	30.1	50.1	40.3	22.5	32.9	35.8	47.5	34.4	46.5	33.0	35.6	25.2	38.2	36.1
PERCENT NMCS	10.4	8.4	16.0	23.0	14.3	3.8	7.1	16.3	11.9	8.9	6.7	7.3	13.0	15.0	5.7	11.9
AVG A/C IN REPTG	16.0	4.3	3.5	3.7	3.6	4.3	4.1	4.0	4.6	3.8	4.0	3.3	3.8	4.0	4.1	3.9
ACT A/C IN REPTG	16.2	4.6	6.0	3.7	3.5	4.8	4.8	4.0	4.6	4.0	4.0	3.3	3.9	4.0	4.3	4.2
FLIGHTS	405	52	56	64	54	55	54	95	54	99	81	52	68	82	50	68
FLIGHT HOURS	682.4	116.9	105.8	116.0	94.5	129.2	133.5	181.4	89.0	205.9	134.1	92.1	115.4	157.4	111.8	129.5
A/C UTILIZATION	42.7	26.3	29.6	30.6	24.6	30.6	33.9	45.4	20.1	52.9	33.5	30.3	29.1	37.9	27.8	33.2
DMMH/FH ML-1	56.9	75.2	106.1	54.2	59.8	47.2	46.4	53.7	81.9	44.3	55.3	56.5	57.5	68.2	58.2	60.9
ML-1 IP	3711	699	2172	1565	1302	784	524	0	75	1377	1005	1054	1243	2456	1738	1210
% A799/A127 ML-1	4.3	0.6	10.1	3.4	4.9	5.2	8.6	2.5	1.5	73.6	5.0	2.1	6.1	3.3	5.0	10.5
ML-2 IP	598	145	169	164	178	123	90	0	23	78	156	105	202	189	205	136
% A799/A127 ML-2	4.1	14.4	7.9	7.7	5.8	5.1	6.1	6.5	4.4	5.7	5.1	4.3	6.0	5.8	3.7	5.9
CANN IP	0	12	15	24	16	11	13	14	37	24	16	9	9	38	15	19
CANN MHRS	1256.3	100.7	96.8	184.3	107.0	78.1	88.9	132.1	178.9	127.3	104.8	31.8	67.3	182.5	103.3	115.0
CANN MHRS/FH	1.8	1.1	1.1	1.1	1.3	2.3	0.8	0.5	2.0	0.4	1.2	0.4	0.6	1.4	1.0	1.1
PREVENTION IP	408	855	567	327	74	119	133	181	95	126	59	104	175	521	49	207
PREVENTION MHRS	2042.9	3643.7	2710.2	1346.7	252.9	1501.1	525.0	1697.8	446.0	940.3	311.9	464.2	626.7	2507.4	140.8	1110.8
TREATMENT IP	216	178	266	307	38	79	44	292	169	56	82	172	82	698	138	190
TREATMENT MHRS	1154.2	347.8	818.4	246.9	105.9	348.9	89.3	537.7	196.4	287.6	576.0	776.3	266.0	1075.2	309.1	443.7
TOTAL MDR MHRS	37610.4	8649.9	10486.0	6556.9	4479.2	6992.8	6749.8	8745.8	6249.4	8770.6	7926.0	4836.9	6302.5	11966.7	4832.0	7505.2

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D. SURVEY SUMMARY

1. Four fleet squadrons were asked the following questions and their responses follow each question (March 2002):

a. Number of aircraft in squadron:

1. Three
2. Four
3. Three
4. Four

b. Number of aircraft IMC prototype:

1. One
2. One
3. None
4. Three

c. Number of aircraft under new maintenance concept:

1. One
2. One
3. One
4. Four

d. Month you expect to be completely under new concept:

1. August 2002
2. October 2002
3. July 2002
4. All four under new maintenance concept.

e. How do the maintainers like the new MRC deck?

1. Confused, but with lots of training, were able to adapt.
2. Great change in improving the inspection requirements.
3. No real opinions yet. Hasn't really affected us a much as other commands. Just implemented last month.
4. They like the MRCs, but actually wonder if they are under inspecting the jets.

f. As Management how do you like the new MRC deck?

1. Like it lots. Will benefit if program is utilized.

2. Excellent changes in inspection cycle.

3. Just implemented first one last month. No real feel for how it will effect maintenance as of yet.

4. I like the new deck, allows greater flexibility.

g. Has your readiness changed since the new MRC deck was implemented?

1. Will increase readiness. By eliminating workload of taking excess panels off, which will be covered by a zonal inspection.

2. Haven't got enough time for an evaluation period. About the same at this time.

3. No change. Only in implementation for less than one month.

4. Affect on readiness is yet to be seen. We have had to great of impact from mini-mods and other stuff hat has adversely affected our aircraft availability. We should see an improvement in July though.

h. What are the advantages you expect with the new maintenance concept?

1. Quicker turn around of aircraft inspections.

2. Quality aircraft upkeep.

3. Less maintenance induced discrepancies from opening up panels that don't need opening. Easier scheduling, no more ASPAs every twelve months.

4. I hope to se shorter turnarounds for scheduled maintenance.

i. Have you realized any of these expected advantages?

1. Too soon to tell.

2. None observed at this time.

3. Not yet. Just implemented last month.

4. Yes—we experienced increased aircraft availability during our dets as a result of shorter inspections, especially since had reduced availability due to mods/conversion.

j. What are the disadvantages you expect to see with the new maintenance concept?

1. Too soon to tell. But only disadvantage would be that personnel not doing a zonal inspection when working in areas fixing other discrepancies.

2. Time period between 56 and 364 day inspection requirements. Too many man hours spent on fixing old parts with no relief in sight.

3. Extended down time while all gripes worked off prior to inspection being completed. Not able to rob off jet to get other jets up (a well known EA-6B way of life.)

4. I expect increased corrosion damage due to lack of preventative maintenance and supply shortages when all of the fleet jets get on IMC program as a result of more in-depth requirements.

k. Have you realized any of these disadvantages?

1. Not yet. Too soon to tell.

2. None observed at this time.

3. Not yet. No IMC jets at this time.

4. Not really-some supply issues but nothing that wasn't relatively short term.

l. What is your opinion of the IMCF Concept?

1. I like it. Implement to all aircraft as soon as practical.

2. Great concept, but it put the burden on O level maintainers.

3. Sounds like a god ideas. I like the every two year vice one year for the major inspection.

4. The IMC program is all right. I think the new MRCs were long overdue. But on the other hand I think they should have just implemented the new MRCs with the old ASPA program. I don't think this is going to reap the long term cost savings they are looking for. Also NADEP JAX is better suited to handle major repairs and large scale cannibalization that will undoubtedly be encountered.

m. What condition do you expect an aircraft coming from an IMCD? Better or worse than a SDLM?

1. Better

2. Better

3. Better

4. Better be better and quicker. Theory has it a lot of the stuff that would have been repaired during the standard SDLM will have already been done during field events.

n. Is the prep for IMCF more labor intensive than for an ASPA?

1. Less intensive.

2. About the same prep.

3. Not really. We usually try to schedule all major inspection (224) with our ASPAs, so it's about the same as all panels required for the 224 day inspection.

4. More in-depth. A lot more panels are opened and more areas are inspected.

o. Other comments or suggestions.

1. None

2. To turn out quality aircraft, we must have quality replacement parts available. Form an inspection team to do this (IMCF) and cycle every aircraft through them. Automatic waivers for the 364 day inspection while deployed not to exceed the next inspection cycle, but perform the inspection as soon as squadron returns.

3. Should be nice while on deployment not having to remove a bunch of panels.

4. Overall-I think it is a good program in theory. But I still think in the long term we will have reduced flexibility when transferring jets due to fixed PEDs, but I bet more short term and last minute exchanges will happen. Plus I feel there will be several supply back logs that will affect the squadrons that are kind of transparent right now because the jets are out of sight out of mind at SDLM. Now it will be on the Wing and squadron to flex to fin the hard to get stuff. Time will tell!

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